WASHINGTON
# SCIENCE TRENDS

HIGHLIGHTS

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## BASIC RESEARCH OPPORTUNITIES

U. S. Army Transportation Corps, in an unusual action, is publicly seeking firms with research and development experience and facilities in two fields of basic research. Details of the proposed procurement will be sent to interested contractors later this month. Here is information now available:

* Volume Recombination of Cesium Ions for Energy Conversion

Firms interested in this field are invited to furnish U. S. Army Transportation Research Command, Ft. Eustis, Va., Attn: Contracting Officer, with information on total number of employees and professional qualifications of scientists, engineers and technical personnel and any other available descriptive literature including financial, which can be used to judge qualifications.

Contact: Mr. R. P. McKinnon, Contractor Administrator. Telephone: Denbigh, Va., Trinity 7-1311, Ext. 21997.

* Basic Research of Effusion Theory

This program involves application to lifting and/or propulsion systems, including research and development to produce effusion materials in experimental quantities.

Firms interested in this field are invited to furnish U. S. Army Transportation Research Command, Ft. Eustis, Va., Attn: Contracting Officer, with information listing scientific and engineering personnel having qualifications in this field and a list of facilities necessary to conduct an experimental verification of effusion processes to produce lift and/or propulsion forces. In addition, the Contracting Office wishes an outline of previous projects in this area of basic research, information on industrial security clearances and any other available descriptive literature, including financial, which can be used to judge qualifications.

Contact: Mr. James W. Epperly, Contract Administrator. Telephone: Denbigh, Va., Trinity 7-1311, Ext. 22900.

## MILITARY TIMING DEVICES

Army Ordnance advisors have recommended that a single agency be assigned the task of coordinating research and development on timing devices for weapon applications.

A survey of 14 military agencies and 120 industrial concerns indicates that at least 96 different timing devices are now under development. Of these, 46 are mechanical, 16 electromechanical and 34 electrical. Functioning times ranged from 0.01 seconds to 10,000 hours. Of the total of 96 devices, 33 have fixed time settings and 63 permit adjustable times. The proposed agency would keep abreast of all such timer work and could determine what new approaches are most likely to succeed on the basis of the latest developments.

* DATA PROCESSING -- U. S. GOVERNMENT

Here are some views on data processing for U. S. Government applications as expressed by John A. Beckett, Assistant Director of the Bureau of the Budget:

ø Rental or Purchase? -- Budget Bureau and General Accounting Office are preparing guidelines on rental vs. purchase of automatic data processing equipment. There is a mounting body of evidence that the more-or-less standard policy of renting all ADP equipment may have to be modified.

ø Computer Service Centers -- By November, 1960 the Budget Bureau hopes to have completed a study on the possibility of establishing one or more computer service centers for government applications.

ø Equipment Sharing -- Hopes exist that some agencies can be encouraged to share existing or new data processing equipment. Even more significant, however, is the move toward integration of data processing systems between various agencies. An example is the program under which the Veterans Administration will develop magnetic tape for processing benefit claims which will also be used by the Treasury Department for benefit check writing. The same tape will carry address codes which is expected to make possible a mechanical pre-sort of checks by location for the convenience of the Post Office Department.

ø ADP Controls -- Bureau of the Budget is organizing a staff of ADP specialists to guide and assist agencies in their data processing problems. However, no special or additional controls over rental or purchase of systems is contemplated beyond the normal budgetary review.

* Here are some preliminary findings on problems associated with ADP in the Government:

ø Almost invariably, ADP costs are underestimated. Variances run as high as 50 percent over budget expectations. This is due to several causes, such as underestimation of machine time requirements; failure to allow for setup time, downtime and maintenance; and the assumption that workload will remain constant -- which rarely occurs.

ø Purposes behind the acquisition of a computer are often so vague and general that the real purpose seems to be to get the computer first -- then figure out how to use it or what to use it for.

ø Computer programming, systems analysis and the writing of instructions, with rare exceptions, take longer than expected -- sometimes over twice as long.

ø There seems to be a general tendency to overlook certain cost items when estimates are made; for example supporting equipment, building modification, training and travel.

ø Punched-card equipment due to be given up when a computer is installed is not released as planned. In many cases, punched-card manual systems due to be discontinued are not, resulting in duplicate systems. And in cases where the new and old equipment operate concurrently until the new system is established the carryover period is often excessive -- six months for example when one or two months would have been sufficient.

This does not mean that all Government experience with ADP is unfavorable. Many installations have proved highly satisfactory. However, identification of problem areas helps to avoid such difficulties in the future.

* MECHANICAL TRANSLATION

The U. S. Government, through at least five different agencies, is spending some $3,207,000 in the current fiscal year on mechanical translation research, in its own laboratories and under contract with private and public research organizations.

A Special Investigating Subcommittee of the House Committee on Science and Astronautics believes that the program "must be vigorously continued" but that improvements could be made.

Here are some of their suggestions:

ø The National Science Foundation could make a greater effort in establishing a coordinated program and generally directing the national effort.

ø A proposal by Georgetown University for a National Academy of Language Sciences "has considerable merit". A national center for machine translation will be required in the near future.

ø All three military services, Army, Navy and Air Force have their own mechanical translation research programs. This effort could well be centered in one service.

ø Most promising program for the long-term is at the National Bureau of Standards. Committee witnesses generally agreed that this method of syntactical analysis would produce the best readable translation as far as sentence structure is concerned.

ø The Air Force, with a more equipment-oriented program, has available a unique tool for the checking out the complex fully automated system of input, logical processing and output.

ø The time has come for those working in mechanical translation to start combining the good features of the various programs. One desirable goal is a special-purpose computer designed for translation which does not include the other costly benefits of an all-purpose computer. There should be an early translating machine production program, with postediting. This would provide working experience and comments from users.

(Report Available. 51 Pages. Single Copies Free. Write Committee on Science and Astronautics, U. S. House of Representatives, Washington 25, D. C. for Report -- Research on Mechanical Translation. For other recent material on this subject see Publication Checklist, Washington SCIENCE TRENDS, June 27, 1960)

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* MILITARY STATESMANSHIP

Here are the words chosen by Rear Adm. J. A. Jaap, Director, Development Programs, Office of the Chief of Naval Operations, to describe the guidance accuracy necessary to place an atomic warhead on a target:

"It is very much like pushing the spear through the ring at the county fair. It's a long spear and a small ring -- and if you want to win your gal that teddy bear with the ribbon 'round its middle, the spear must be very precisely aimed."

(From an address cleared and published by the Department of Defense, Office of Public Affairs, before the Institute of Navigation, June 24, 1960.)

* MARINE PROCUREMENT PLANS

The U. S. Marine Corps expects to spend $139.8 million during the new fiscal year for procurement of equipment and supplies. Approximately 80 percent of this amount is for modernization items.

Here is a summary of procurement plans of technical interest:

ø Ammunition, Ordnance, Missiles -- Approximately $88 million.

Funds will provide Hawk surface-to-air missiles and helicopter-transportable ground equipment. Infrared-guided Redeye missiles will be purchased for troop training and evaluation of organization and operational concepts. Ammunition, for training and mobilization reserve stocks, will include 7.62 millimeter ammunition, various types of artillery and rockets, antitank, mortars, and demolitions and pyrotechnics. The second of three annual increments of the Davy Crockett weapons systems is planned.

ø Communications/Electronics -- Approximately $37 million.

Equipment will include single sideband radio receivers to permit reception of emergency information by low-echelon combat forces; improved antenna masts to increase the communication range of radio relay equipment; facsimile equipment to permit radio transmission of printed matter such as maps or photographs; multichannel radio equipment to provide reliable communications at distances up to 100 miles; modernization kits for radars to increase performance and decrease susceptibility to enemy jamming or deception; equipment to permit rapid collection and dissemination of combat intelligence information; modern radars for improvement of air defense capability during an amphibious assault; devices to be used by personnel to determine areas of atomic radiation; test and maintenance equipment. In addition, the Navy will provide necessary aeronautical and cryptographic equipment.

ø Support Vehicles -- Approximately $5.8 million.

This category includes commercial-type buses, cargo trucks and various replacement vehicles. There are also 85 amphibian trucks to replace World War Two types.

ø Construction/Materials Handling -- Approximately $6.8 million.

Equipment will include a mobile photomapping facility for a Marine topographic company and 300-pound reproduction "heli-cop huts" which will replace the present reproduction train consisting of five truck-mounted vans which weigh approximately 120,000 pounds.

To implement the Small Airfield Tactical Support (SATS) concept the Marines will modify existing stocks of aluminum matting which are unsuitable for surfacing airfields for tactical jet operations. The modification consists of a plate riveted on the top and an improved end connection -- which adds strength and alleviates dust conditions.

In addition, this category will include replacement of such items as welders, water purification units, tractors, scrapers, graders, rough-terrain forklifts and gasoline winches for movement of palletizied supplies in helicopter-supported areas. Heavy construction equipment will be sectionalized for air or helicopter transport.

# RESEARCH CHECKLIST

( ) ALUMINOSILICATE GLASS: Navy studies indicate that aluminosilicate glasses can be used satisfactorily for enclosing ultrahigh vacuum devices to be used in electron tube research. Experience indicates that potash soda lead glass cannot stand the high bake temperature which is useful in obtaining low pressures, while borosilicate and high silicon glasses cannot be used with helium under the required conditions.

(R&D by Electron Tube Engineering Section, Electronics Division, U. S. Naval Research Laboratory, Washington 25, D. C.)

( ) PLASTIC INSULTATORS: Plastic has been used successfully to replace ceramic insulators for antenna masts for the Carrier USS Forrestal. The insulators were designed to withstand only 17,000 pounds, but a test pull reached 51,300 pounds before the test rig pulled apart due to the failure of a small metal bolt. The insulators were built at the Norfolk, Va. Naval Shipyard of 35-percent fiberglass and 65-percent polyester resin.

( ) FLUORESCENT LAMP STANDARDS: A spectroradiometer has been constructed at the National Bureau of Standards which is said to simplify the calibration of fluorescent lamp color standards. The device can also measure the relative spectral irradiance of any source or source-filter combination.

(For details write National Bureau of Standards, Office of Technical Information, Washington 25, D. C. Ask for STR--Spectroradiometer)

( ) SOIL TESTING DEVICE: The Federal Housing Administration believes it has found an engineering short cut to evaluating potentially dangerous conditions existing in some clay soils used in residential housing developments. The device, known as FHA Soil PVC Meter TS 5:6 measures the maximum potential volume change that the soil could undergo when subjected to changing moisture conditions due to swelling or shrinkage.

(Meter developed under FHA contract by T. W. Lambe, Massachusetts Institute of Technology, Cambridge, Mass. Complete details to be published by FHA, Washington 25, D. C. at a later date.)

( ) NUCLEAR SULFUR MINING: The use of atomic underground explosions for the mining of sulfur has been proposed as part of the Atomic Energy Commission's "Plowshare" program for the peaceful uses of nuclear detonations. Under the proposal an atomic device would be lowered to a sulfur deposit with the aid of conventional rotary drilling techniques. It is believed that a nuclear blast would raise the sulfur to a molten state for recovery through various types of wells used by the petroleum industry.

(Proposal by J. M. Dales and R. C. DeHart, Southwest Research Institute, San Antonio, Tex. presented to American Institute of Chemical Engineers)

( ) HIGH ALTITUDE RECOVERY SYSTEM: Spherical drag balloons of coated fabric have been developed for the Air Research and Development Command by Goodyear Aircraft. The balloons are to be tested this summer with modified Cree test missiles, with attempts made to retard tumbling and control speed of instrumented nose cones during re-entry. Parachutes will also be used to aid recovery.

# P U B L I C A T I O N  C H E C K L I S T

( ) LUNAR CONSTRUCTION AND MAPPING: Will the Army Engineers win the privilege of constructing bases on the Moon? A Congressional committee ponders the question and comes up with some interesting preliminary studies. 18 Pages. Single Copies Free. (Write Committee on Science and Astronautics, U. S. House of Representatives, New House Office Bldg., Washington 25, D. C. for Report Serial f -- Lunar Construction and Mapping.)

( ) ARMS CONTROL, a report recommending the establishment of a government organization and procedure for handling problems of international arms control. $1. (Write Publications Office, National Planning Association, 1606 New Hampshire Avenue, N. W., Washington, D. C. for Report--Strengthening the Government for Arms Control.)

( ) SOLID STATE LIGHT AMPLIFIERS, an excellent survey by the U. S. Naval Ordnance Test Station, China Lake California on solid-state light amplifiers and allied devices, particularly those which might be applied to range instruments for weapon testing. Typical subjects include thin films, image tubes, electroluminescence, etc. 60 Pages. $1.50. (Write OTS, U. S. Department of Commerce, Washington 25, D. C. for NAVORD Report 6603.)

( ) MERCURY BAROMETERS AND MANOMETERS, a new handbook designed to fill the needs of manufacturers and users of these devices. Describes various designs with particular emphasis on design elements which may affect accuracy. Includes information which is scattered throughout the literature, and is in some cases unpublished. 59 Pages. 40 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. C 13.44:14.)

( ) OCEANOGRAPHY, a transcript of statements, testimony and exhibits before a Congressional committee on proposed legislation to provide financial assistance to educational institutions and students in the field of oceanography. 76 Pages. Single Copies Free. (Write Committee on Science and Astronautics, U. S. House of Representatives, New House Office Building, Washington 25, D. C. for Hearings--Frontiers in Oceanic Research.)

( ) DEFENSE FELLOWSHIPS, an official explanation of the so-called National Defense Fellowship Program including origin and purposes, requirements for approval of programs and grants to institutions. 5 Pages. Single Copies Free. (Write Publications Inquiry Unit, U. S. Office of Education, Department of Health, Education and Welfare, Washington 25, D. C. for Leaflet -- National Defense Graduate Fellowhip Program, 1960.)

( ) SUBCONTRACTING CASE STUDY, legislators take a critical look at the program for ground support air conditioning equipment for the B-58 bomber. 53 Pages. Single Copies Free. (Write Select Committee on Small Business, U. S. Senate, Washington 25, D. C. for Case Study in Subcontracting by Weapon-System Contractor.)

( ) TECHNICAL INFORMATION SERVICES, a European report and case study of how various small firms have developed and adapted their own technical information services. Single Copies Free. (Write Information Division, European Productivity Agency, OEEC, 3 Rue Andre Pascal, Paris XVI, France for Report and Annex -- "How to Set up Your Technical Information Service".)